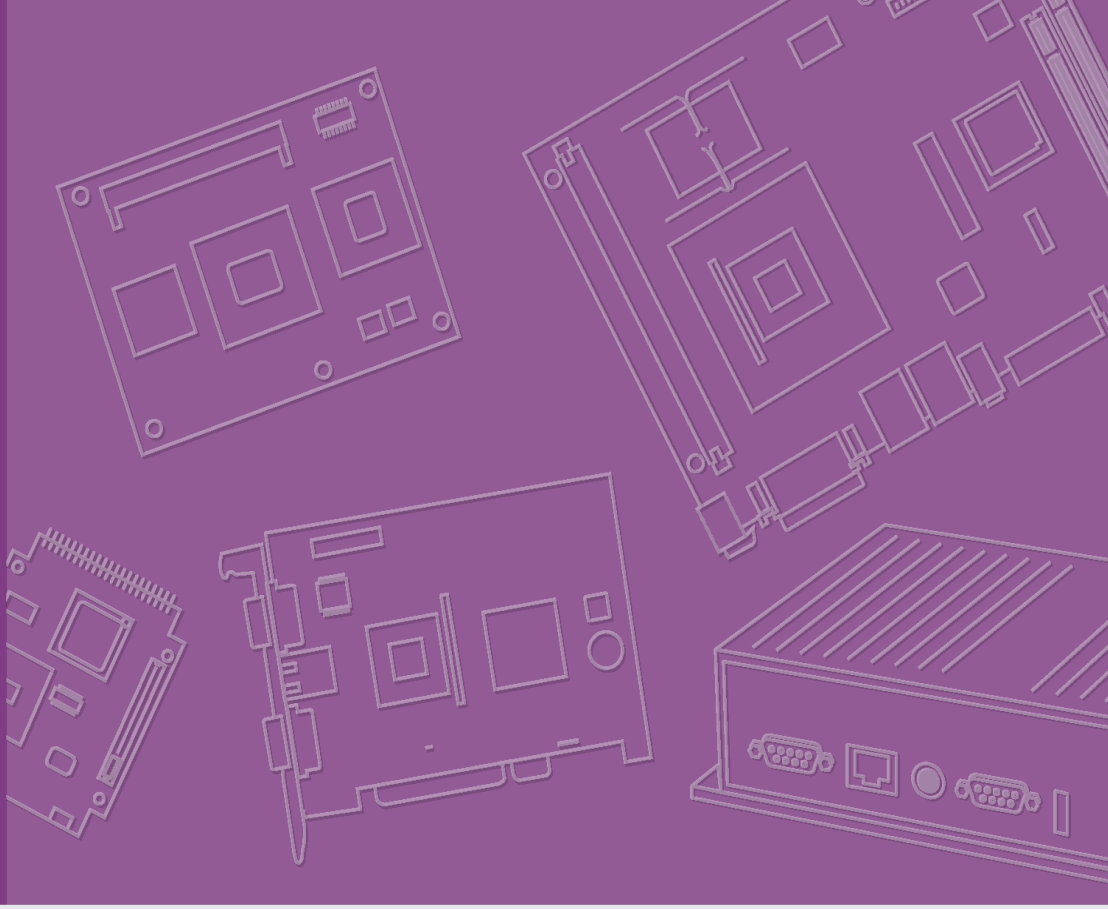

User Manual

IDK-2108 Series

8.4" High Brightness SVGA (LED Backlight)

Trusted ePlatform Services

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5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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Chapter 1

Overview

1.1 General Description

IDK-2108 series is a Color Active Matrix Liquid Crystal Display composed of a TFT-LCD panel, a driver circuit, and backlight system. The screen format is intended to support SVGA 800 x 600 pixels (H x V) screen @ 16.2M colors (RGB 8-bits) or 262k colors (RGB 6-bits). All input signals are LVDS interface compatible. Driver board of the backlight is included.

1.2 Specifications

1.2.1 LCD Panel

- **Display Size:** 8.4" LED backlight panel
- **Resolution:** 800 x 600
- **Viewing Angle (U/D/L/R):** 75°/75°/75°/75°
- **Brightness:** 1200 cd/m2
- **Contrast Ratio:** 600:1
- **Response Time (ms):** 30ms
- **Colors:** 262K/16.2M
- **Voltage:** 3.3V
- **Power Consumption:** 4.32W
- **Signal Interface:** 1 channel LVDS
- **Weight:** 260 g (N series)
- **Dimensions (W x H x D):** N series: 203.0 x 142.5 x 9.0mm
  R series: 203.0 x 142.5 x 10.12mm

1.2.2 LED Driver Board

- **Efficiency:** 85%
- **Output Current & Voltage:** 200 mA/17.1 V
- **Dimensions (W x H x D):** 70 x 16 x 5mm

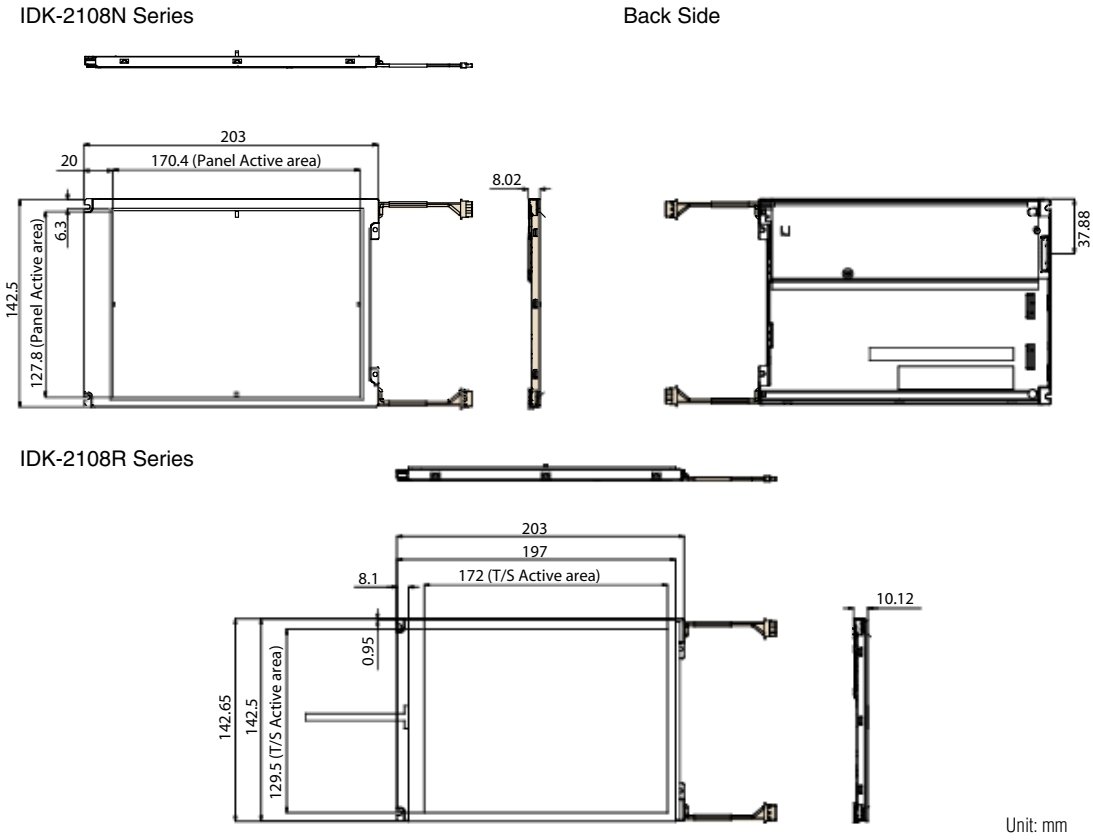
1.2.3 Touch Screen (R series)

- **Touch Screen:** 4-Wire Resistive
- **Light Transmission:** 82 ± 3%
- **Durability:** 1 million times

1.2.4 Environment

- **Operating Temperature:** -5 ~60°C
- **Storage Temperature:** -30 ~ 85°C
- **Humidity:** 5~ 95% @ 40°C, non-condensing

1.3 Mechanical Characteristic



1.4 Functional Block Diagram

The following diagram shows the functional block of the 8.4 inches Color TFT-LCD Module:

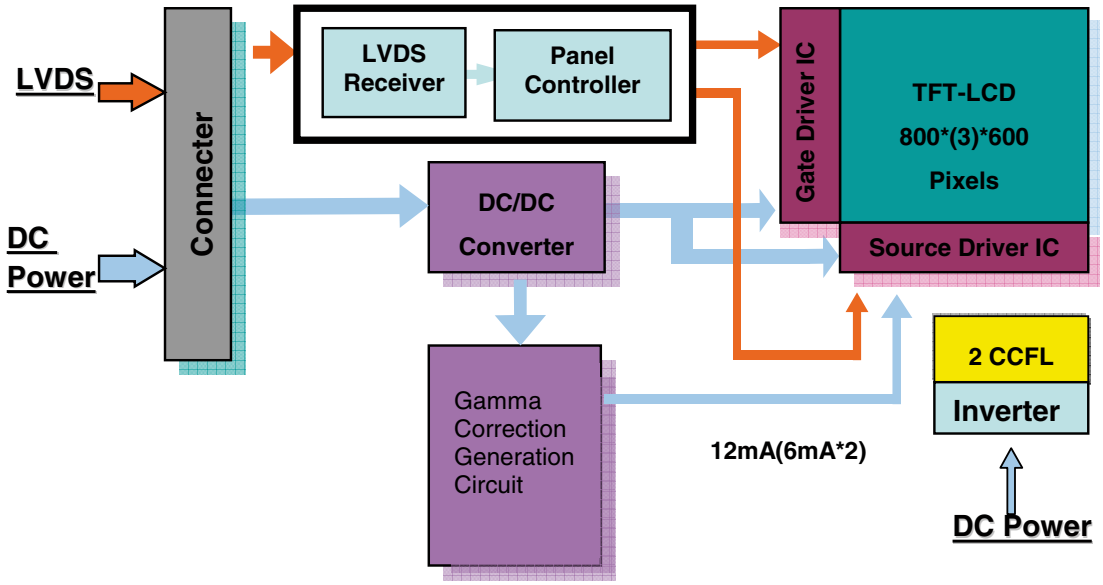


Figure 1.1 Function block diagram

1.5 Touch Screen driver

The T/S driver CD-ROM is in the accessory box and comes with the product.

1.6 Absolute Maximum Ratings

Absolute maximum ratings of the module is as following:

1.6.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Conditions
Logic/LCD Drive Voltage	Vin	0.3	+3.6	[Volt]	Note 1, 2

1.6.2 Absolute Ratings of Backlight Unit

Item	Symbol	Min.	Max.	Unit	Conditions
LED Light Bar Current	Led	150*2	160*2	[mA]	Note 1, 2

1.6.3 Absolute Ratings for Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	-5	+60	[oC]	
Operation Humidity	HOP	5	95	[%RH]	
Storage Temperature	TST	-30	+85	[oC]	
Storage Humidity	HST	5	95	[%RH]	

Note1: Within Temp= 25°C

Note2: Permanent damage to the device may occur if maximum values are exceeded

Chapter 2

Electrical Characteristics

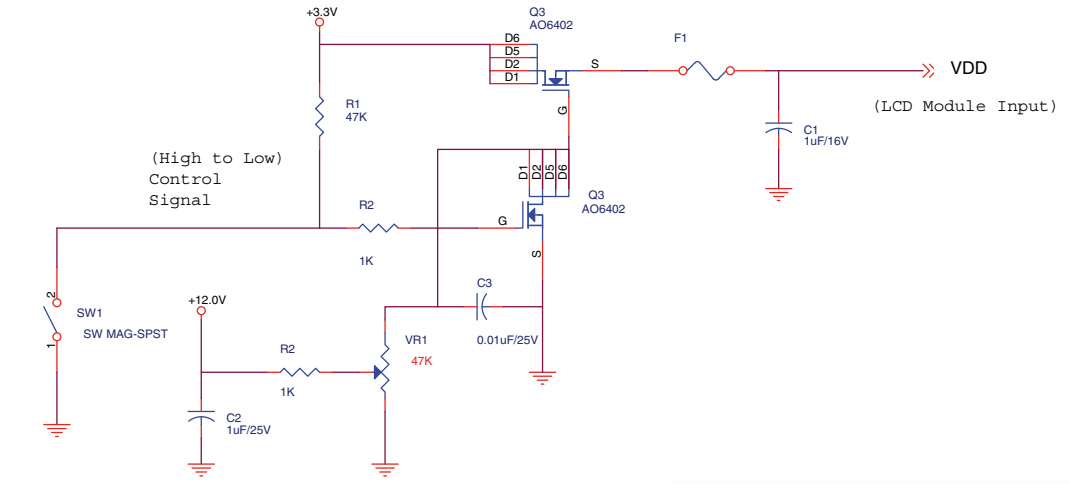
2.1 Power Specification

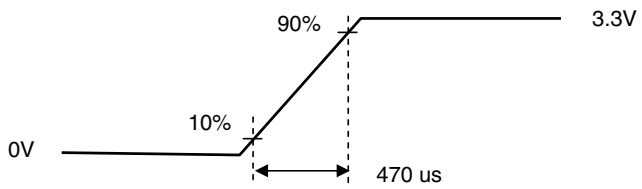
Input power specifications are as follows:

Table 2.1: Power specification

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[Volt]	10%
IDD	Input Current	-	270	330	[mA]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
PDD	VDD Power	-	0.9	1.2	[Watt]	64 Gray Bar Pattern (VDD=3.3V, at 60Hz)
Rush	Inrush Current	-	-	3	[A]	Note 1

Note1 Measurement condition:





VDD rising time

64 Gray pattern

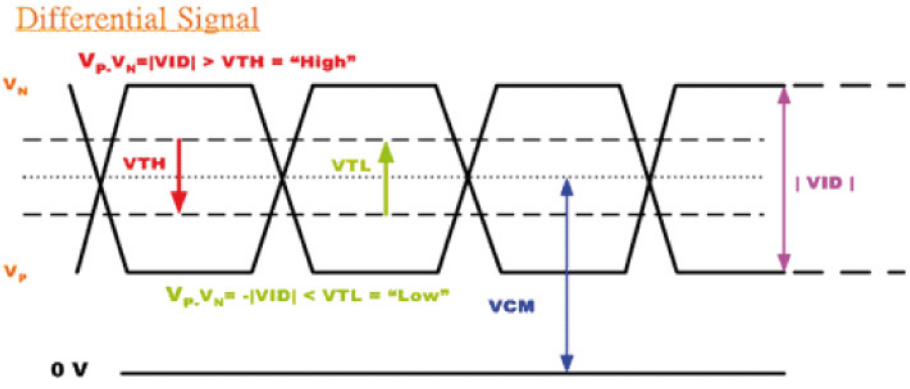
2.1.1 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Table 2.2: Signal electrical characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
VTH	Differential Input High Threshold	-	-	100	[mV]	VCM=1.2V
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VCM=1.2V
| VID |	Input Differential Voltage	100	400	600	[mV]	
VICM	Differential Input Common Mode Voltage	1.1	-	1.6	[V]	VTH / VTL = 100mV

Note LVDS Signal Waveform.



2.2 Backlight Driving Conditions

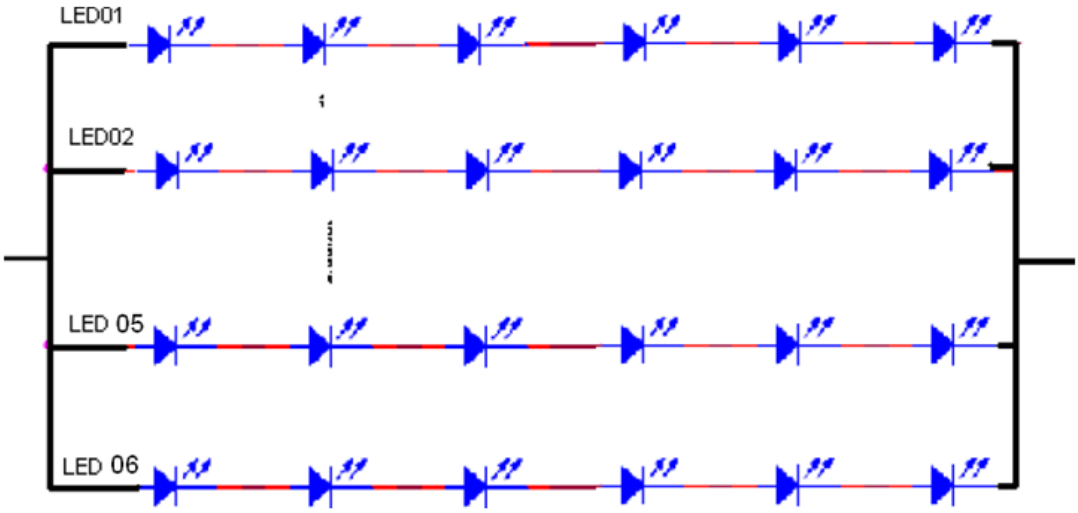
Parameter guidelines for LED light bar driver are under stable conditions at 25°C (Room Temperature):

Table 2.3: Backlight driving conditions

Item	Symbol	Values			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	VL	17.5		17.5	V	Note 2
LED Current	IL	150		160	mA	Note 2
LED life time	-	50,000	-	-	Hr	Note 1

Note1 The "LED life time" is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C and typical LED Current at 160mA.

Note2 The LED driving condition is defined for each LED module. (6 LED Serial, a LED includes 1 Chip).



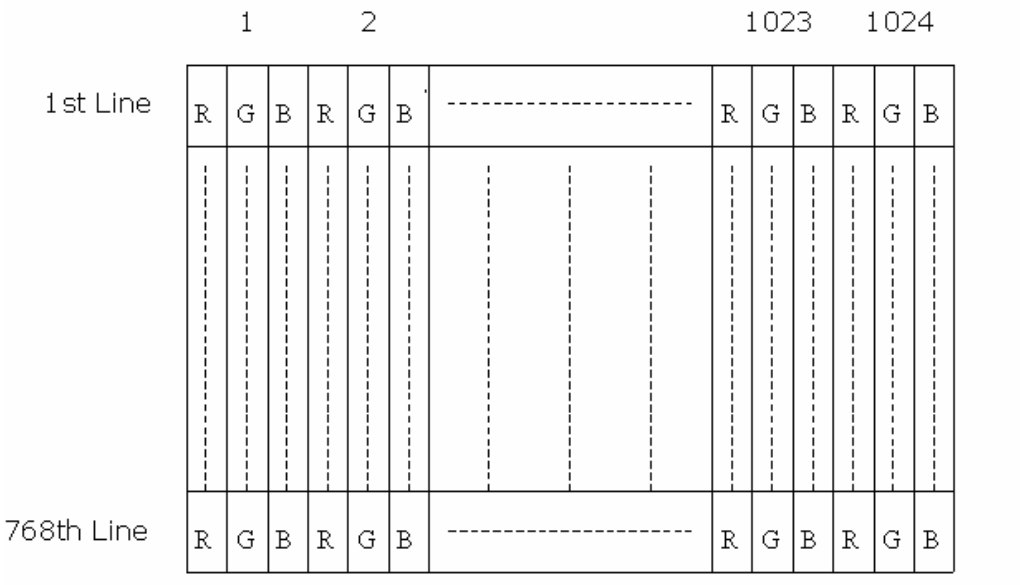
Note3 The variance of LED Light Bar power consumption is 10%. Calculator value for reference (IL x VL x 2 = PLED)

Chapter 3

Signal Characteristics

3.1 Pixel Format Image

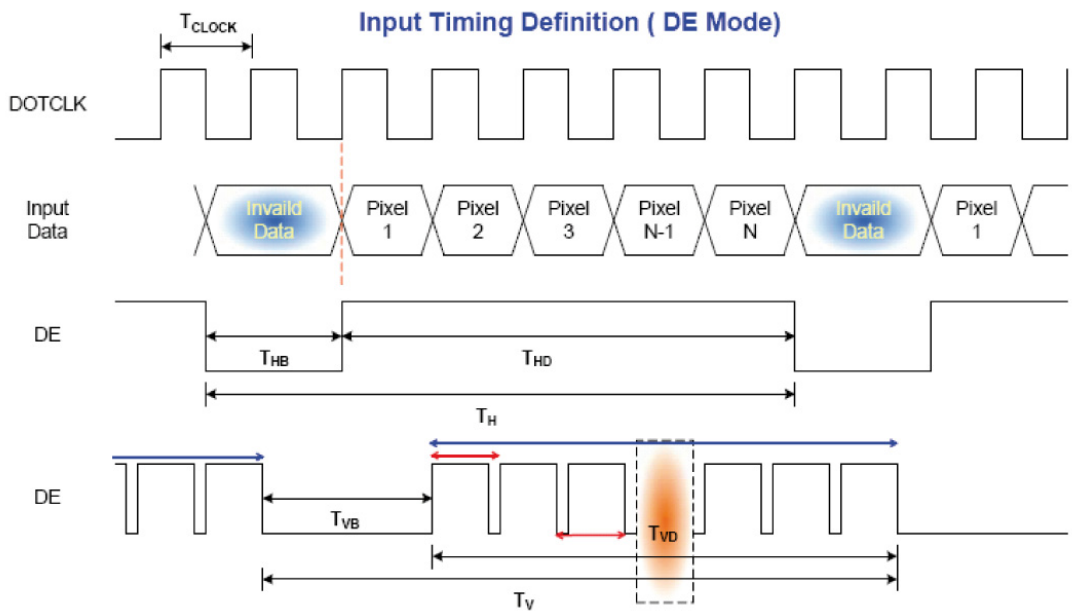
The following figure shows the relationship between the input signal and LCD pixel format.



3.2 Signal Description

Table 3.1: Symbol Description

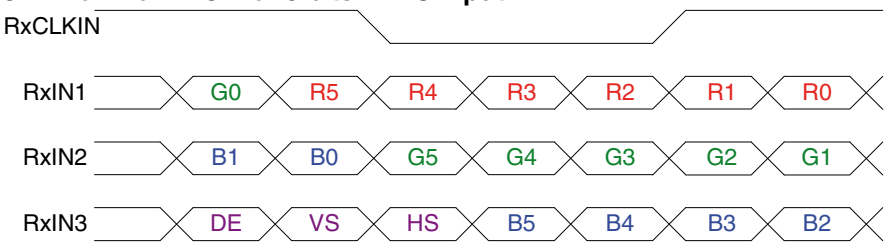
Pin No.	Symbol	Description
1	VDD	Power Supply,3.3V(typical)
2	VDD	Power Supply,3.3V(typical)
3	UD	Vertical Reverse Scan Control. Low or NC -> Normal mode, Height -> Vertical Reverse Scan (Note)
4	LR	Horizontal Reverse Scan Control. Low or NC -> Normal mode, Height -> Vertical Reverse Scan (Note)
5	RxIN1-	LVDS differential data input Pair 0
6	RxIN1+	
7	GND	Ground
8	RxIN2-	LVDS differential data input Pair 1
9	RxIN2+	
10	GND	Ground
11	RxIN3-	LVDS differential data input Pair 2
12	RxIN3+	
13	GND	Ground
14	RxCLKIN-	LVDS differential Colock input Pair
15	RxCLKIN+	
16	GND	Ground
17	SEL68	LVDS 6/8 bit select function control, Low or NC 6 Bit Input Mode. High 8-bit Input Mode (Node)
18	NC	NC
19	RxIN4-	LVDS differential data input Pair 3. Must be connected to Ground in 6-bit input mode.
20	RxIN4+	



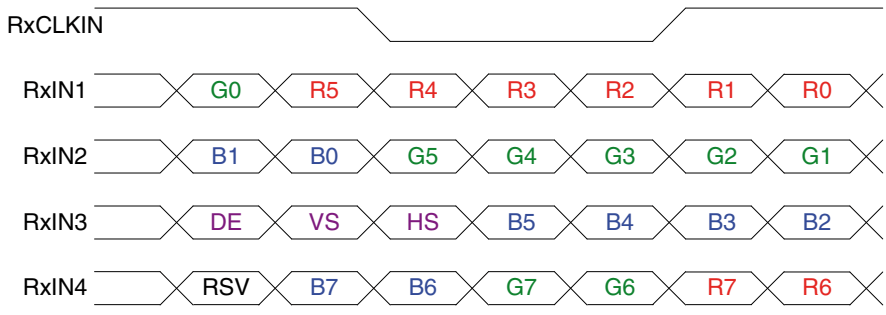
3.3 The Input Data Format

3.3.1 SEL68

SEL68 = ”Low” or “NC” for 6 bits LVDS Input



SEL68 = “High” for 8 bits LVDS Input

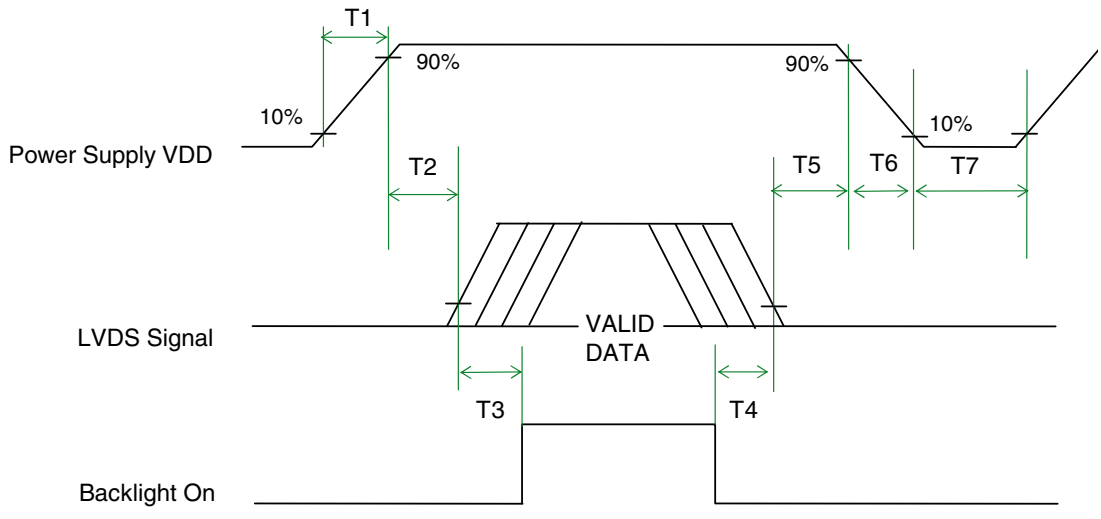


Note1: Please follow PSWG.

Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	Remark
R7	Red Data 7	Red-pixel Data, For 8 bits LVDS input, MSB: R5; LSB:R0
R6	Red Data 6	
R5	Red Data 5	
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0	
G7	Green Data 7	Green-pixel Data, For 8 bits LVDS input, MSB: G7; LSB:G0
G6	Green Data 6	
G5	Green Data 5	
G4	Green Data 4	
G3	Green Data 3	
G2	Green Data 2	
G1	Green Data 1	
G0	Green Data 0	
B7	Blue Data 7	Blue-pixel Data, For 8 bits LVDS input, MSB: B7; LSB:B0
B6	Blue Data 6	
B5	Blue Data 5	
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0	
RxCLKIN	LVDS Data Clock	°°
DE	Data Enable Signal	When the signal is high, the pixel data shall be valid to be displayed.
VS	Vertical Synchronous Signal	°°
HS	Horizontal Synchro-nous Signal	

Note: Output signals from any system shall be low or Hi-Z state when VDD is off.



3.4 Interface Timing

3.4.1 Timing Characteristics

Table 3.2: Timing Characteristics

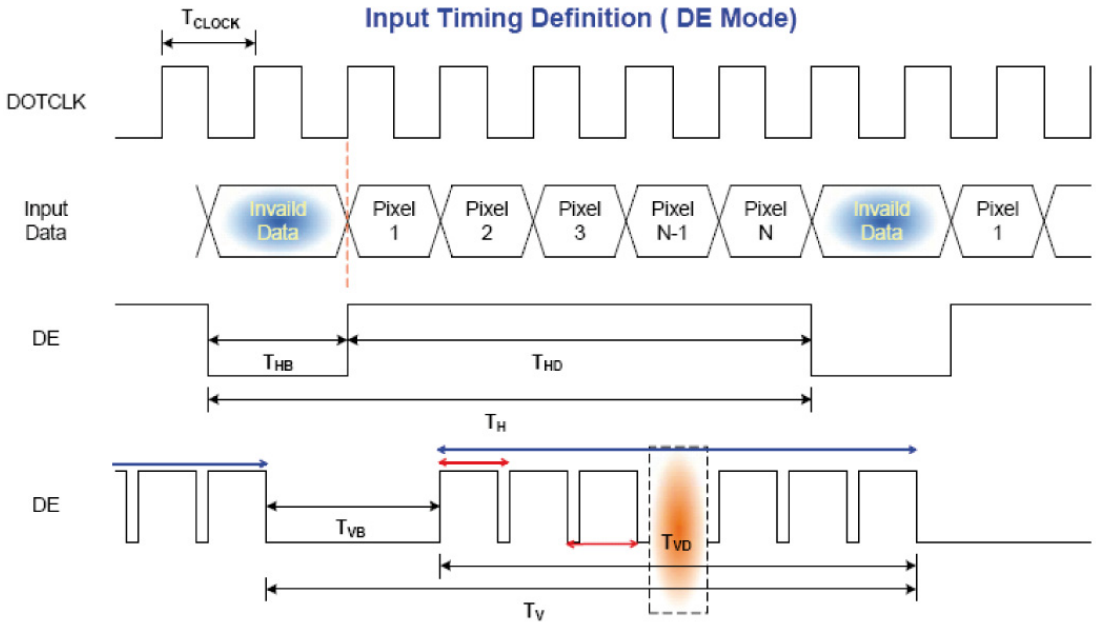
Signal	Parameter		Symbol	Min.	Typ.	Max.	Unit
Clock Timing	Clock frequency		1/ T_{Clock}	50	65	81	MHz
Vsync Timing	Vertical Section	Period	T_V	776	806	1024	T_{Line}
		Active	T_{VD}	768	768	768	
		Blanking	T_{VB}	8	38	256	
Hsync Timing	Horizontal Section	Period	T_H	1054	1344	2048	T_{Clock}
		Active	T_{HD}	1024	1024	1024	
		Blanking	T_{HB}	30	320	1024	

Note Frame rate is 60 Hz.

Note DE mode.

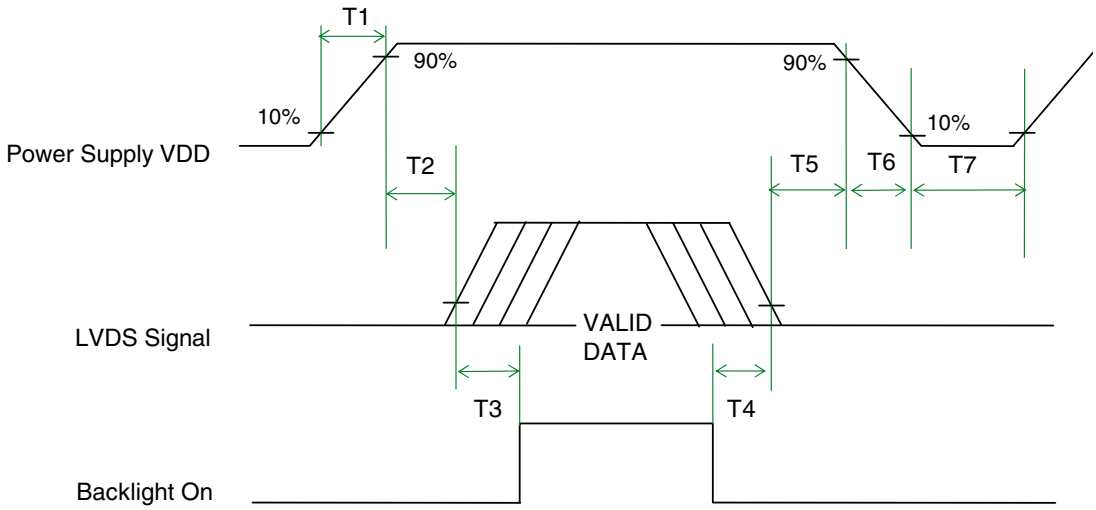
Note Typical value refer to VESA STANDARD

3.4.2 Input Timing Diagram



3.5 Power ON/OFF Sequence

VDD power and lamp on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	40	50	[ms]
T3	200	-	-	[ms]
T4	200	-	-	[ms]
T5	0	16	50	[ms]
T6	0	-	10	[ms]
T7	1000	-	-	[ms]

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

Chapter 4

Connector & Pin Assignment

4.1 TFT LCD Module

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

4.1.1 Connector

Table 4.1: Connector	
Connector Name / Description	**Signal Connector**
Manufacture	STM
Connector Model Number	MSB24013P20 or Compatible
Adaptable Plug	P24013P20

4.1.2 Pin Assignment

Table 4.2: Pin Assignment			
Pin No.	**Signal Name**	**Pin No.**	**Signal Name**
1	VDD	2	VDD
3	UD	4	LR
5	RxIN1-	6	RxIN1+
7	GND	8	RxIN2-
9	RxIN2+	10	GND
11	RxIN3-	12	RxIN3+
13	GND	14	RxCLKIN-
15	RxCLKIN+	16	GND
17	SEL68	18	NC
19	RxIN4-	20	RxIN4+

4.2 Backlight Unit

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

Connector Name / Designation	**LED Light Bar Connector / Backlight lamp**
Manufacturer	SPEEDCON
Type Part Number	WRC-1XX-DRXX00D
Mating Type Part Number	NA

4.2.1 Signal for LED light bar connector

	Connector No.	**Pin No.**	**Input**	**Color**	**Function**
Upper	CN1	1	HI 1	Red	Power supply for backlight unit
		2	GND 1	Black	Ground for backlight unit
Lower	CN2	1	HI 2	Red	Power supply for backlight unit
		2	GND 2	Black	Ground for backlight unit

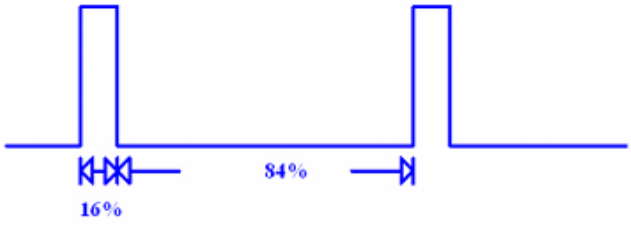
Cable Length : 250mm+/-10mm

4.2.2 LED Driver Board

4.2.2.1 Specification:

Table 4.3: Specification

Symbol	Characteristics	Condition	Min.	Typ.	Max.	Unit
Input	Voltage		10	12	15	V
	Efficiency	Vin=12V, Iout=1A, Vout=18V		90		%
	Power		1.2		30	W
Output	Voltage		18		24	V
	Current		100		1000	mA
	Current Accuracy	100mA≤Iout≤1000mA		±5	±10	%
Protection			OVP			
Environment	Thermal Shutdown			165		°C
	Operating Junction Temperature				125	°C
	Operating Temperature		-20		+70	°C
	Storage Temperature		-40		+ 85	°C
PWM Dimmer	Dimmer range (Note. 1)		16		100	V
	Dimmer VH		2		5	V
	Dimmer VL		0		1.5	V
	Dimmer Frequency		0.25	0.5	1	KHz
ON/OFF	Von		3.5		5.5	V



Note1: When the input PWM signal, the high-level digital output must be greater than the total output level of only 16% of out.

4.2.2.2 Input connector pin define

Table 4.4: Input connector pin define

Pin No.	Pin Define
1	Vin(+12V)
2	Vin(+12V)
3	GND
4	GND
5	ON/OFF(0V: Off ; +5V: On)
6	Dimming (PWM)

4.2.2.3 Output connector pin define

Table 4.5: Output connector pin define	
Pin No.	**Pin Define**
1	VLED-
2	VLED+

4.2.2.4 Dimension

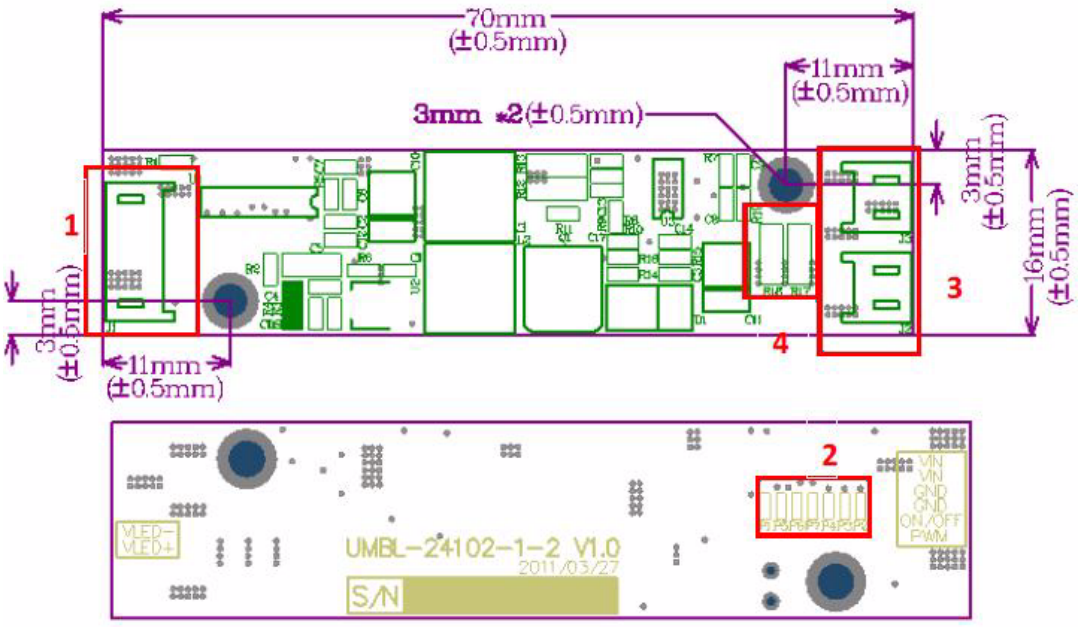


Figure 4.1 Dimension

Appendix A

Optical Characteristics

A.1 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature):

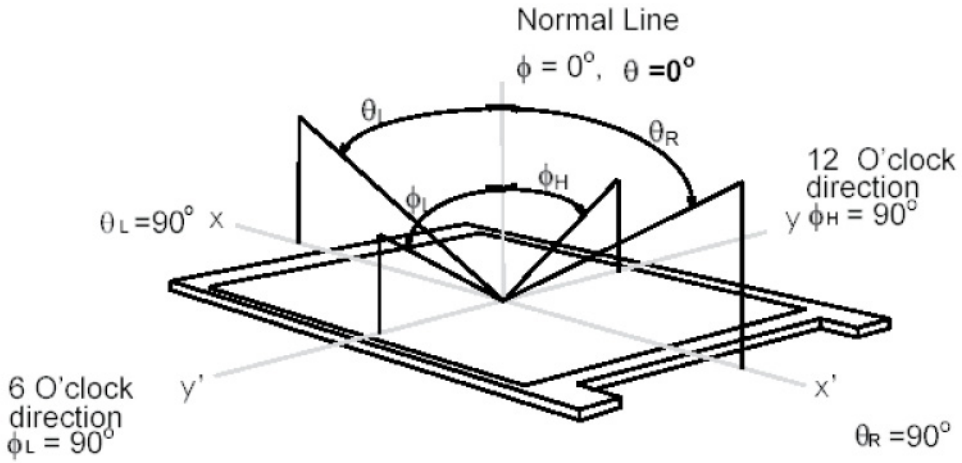
Table A.1: Optical Characteristics

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right)		80	-	1
		CR = 10 (Left)		80		
		Vertical (Upper)		80	-	
		CR = 10 (Lower)		60		
Luminance Uniformity	[%]	9 Points	75	85	-	2, 3
Optical Response Time	[msec]	Rising	-	20	30	5
		Falling	-	10	20	
		Rising + Falling	-	30	50	
Color/Chromaticity Coordinates (CIE 1931)		White x	-	0.313	-	4
		White y	-	0.322	-	
Color Temp.	K		-	6500		
White Luminance	[cd/m^2]		1100	1200	-	4
Contrast Ratio			400	600	-	4

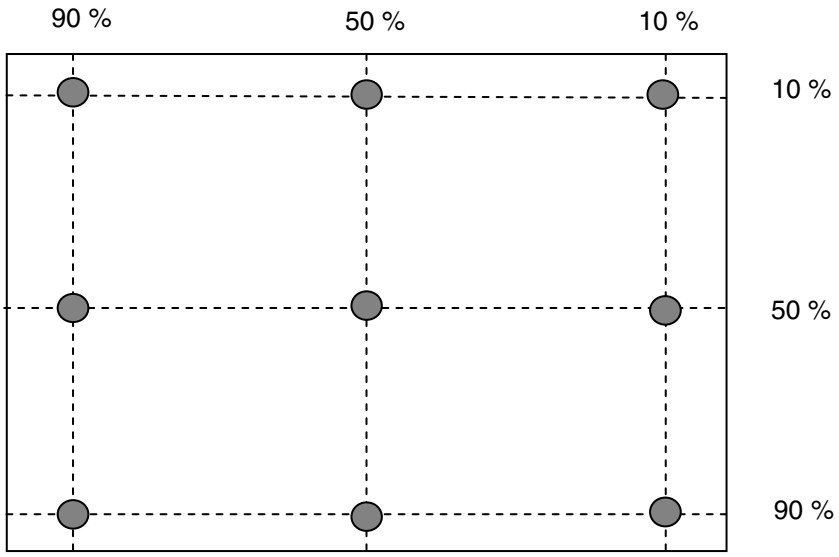
Note Optical Equipment: BM-7, DT-101, or equivalent

Note 1 Definition of viewing angle

Viewing angle is the measurement of contrast ratio, at the screen center, over a 180° horizontal and 180° vertical range (off-normal viewing angles). The 180° viewing angle range is broken down as below: 90° (θ) horizontal left and right, and 90° (Φ) vertical high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated to its center to develop the desired measurement viewing angle.



Note 2 9 point position

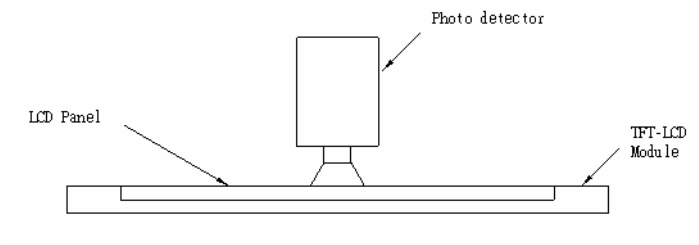


Note 3 The luminance uniformity of 9 points is defined by dividing the maximum luminance values by the minimum test point luminance

$$\delta_{W9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

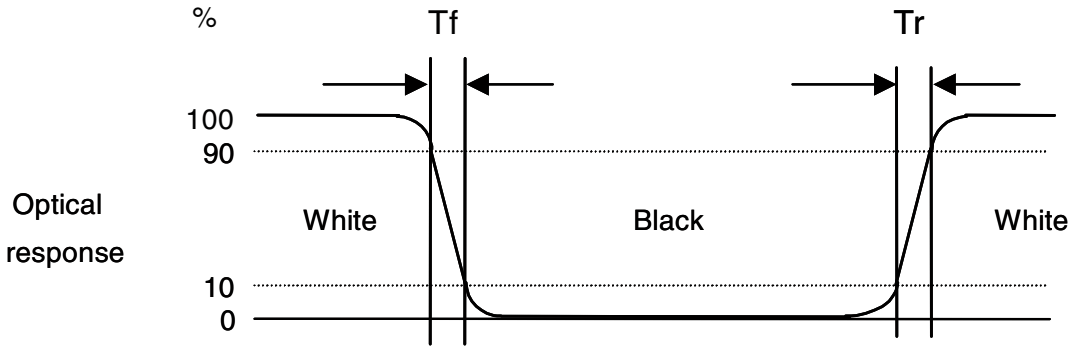
Note 4 Measurement method

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature changes during measuring. In order to stabilize the luminance, the measurement should be executed after the backlight has been lit for 30 minutes in a stable, windless and dark room using optical equipment: DT-100 or equivalent.



Note 5 Definition of response time

The output signals of the photo detector are measured when the input signals are changed from "Full Black" to "Full White" (rising time), and from "Full White" to "Full Black "(falling time), respectively. The response time is the interval between the 10% and 90% of amplitudes. Please refer to the figure below.



Appendix B

Handling Precautions

B.1 Optical Characterisctics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature)

1. Since the front polarizer is easily damaged, pay attention not to scratch it.
2. Be sure to turn off the power supply when inserting or disconnecting from the input connector.
3. Wipe off water drops immediately. Long contact with water may cause discoloration or spots.
4. When the panel surface is soiled, wipe it with absorbent cotton or other soft cloths.
5. Since the panel is made of glass, it may break or crack if dropped or bumped on a hard surface.
6. Since CMOS LSI are used in this module, take care of static electricity and insure you are earthed when handling.
7. Do not open or modify the module assembly.
8. Do not press the reflector sheet at the back of the module to any directions.
9. In case a module has to be put back into the packing container after it has been removed, please press the ends of the LED light bar reflector edge softly. Otherwise the TFT module may be damaged.
10. At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
11. After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. When designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.
12. Small amounts of materials with no flammability grading are used in the LCD module. The LCD module should be supplied by power which complies with the requirements of Limited Power Source (IEC60950 or UL1950), or be applied for exemption.

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